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Plotosus fisadoha, a new species of marine catfish (Teleostei: Siluriformes: Plotosidae) from Madagascar

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Abstract.—A new species of plotosid catfish, *Plotosus fisadoha,* is described from the coastal waters of southeastern Madagascar. *Plotosus fisadoha* can be distinguished from congeners by the following unique combination of characters: head length 23.7–23.9 %SL; head width 13.7–15.2 %SL; head depth 11.5–11.8 %SL; body depth at dorsal-fin origin 13.1–13.3 %SL; pectoral-fin length 14.9–15.0 %SL; pelvic-fin length 9.7–9.8 %SL; snout length 39.0–39.2 %HL; interorbital distance 32.9–33.4 %HL; eye diameter 13.1–14.3 %HL; nasal barbel length 40.7–44.0 %HL; maxillary barbel length 47.0–52.3 %HL; outer mandibular barbel length 47.0–47.7 %HL; 58–59 vertebrae; 10 caudal-fin rays; 164–171 total confluent median fin rays; and uniform brown coloration.

The family Plotosidae (eel-tailed catfishes) is a small assemblage of marine and freshwater catfishes found throughout the Indo-Pacific. Allen & Feinberg (1998) recognized 31 species in 10 genera. The systematics of Plotosidae are poorly understood, and there have been few revisionary studies (e.g., Gomon & Taylor 1982, Allen 1998), none encompassing the entire assemblage. *Plotosus* is primarily marine and distributed throughout the Indo-Pacific. *Plotosus* is distinguished from other plotosid genera by the following unique combination of characters (Gomon & Taylor 1982): a dendritic organ posterior to the anus, gill membranes separate and free from the isthmus, four pairs of barbels, lips without lobes or barbel-like extensions, tubular anterior nostril at or above the edge of the upper lip, and teeth on the premaxilla. Of the characters described above, only the presence of a dendritic organ is a synapomorphy of some plotosids, although it is not unique to *Plotosus* (present also in *Paraplotosus, Cnidoglanis, Euristhmus* and *Oloplotosus*). Six species of *Plotosus* are currently considered valid (Gomon & Taylor 1982; Ferraris *in* Randall & Lim 2000), viz. *Plotosus abbreviatus* Boulenger 1895, *P. canius* Hamilton 1822, *P. limbatus* Valenciennes, *in* Cuvier & Valenciennes 1840, *P. lineatus* (Thunberg 1787), *P. nkunga* Gomon & Taylor 1982, and *P. papuensis* Weber 1910.

While conducting a survey of the fresh and brackish water fishes of Madagascar, the second author obtained specimens of *Plotosus* from the southeastern coast of the island that are morphologically distinct from any previously described species. The description of this material forms the basis of this contribution.

Methods

Measurements were made with dial calipers and data recorded to 0.1 mm. Counts and measurements were made on the left side of the specimens whenever possible. Vertebral and median fin-ray counts were taken from radiographs. In tables and text, subunits of the head are presented as proportions of head length (%HL), whereas head length and measurements of body

Fig. 1. *Plotosus fisadoha,* holotype, UMMZ 232679, 191.8 mm SL, Madagascar: southeastern coast: Fianarantsoa Province: Farafangana market.

parts are given as proportions of standard length (%SL).

Measurements and terminologies follow those of Gomon & Taylor (1982), except for vertebral counts, which include the complex anterior vertebra and count the first free vertebra as the sixth. Institutional acronyms follow Leviton et al. (1985).

Plotosus fisadoha, new species
Fig. 1

Holotype.—UMMZ 235269, 191.8 mm SL; Madagascar: southeastern coast Fianarantsoa Province; Farafangana market; acquired from fisherpersons; J. S. Sparks, K. J. Riseng, & P. N. Reinthal, 18 Jun 1994.

Paratypes.—UMMZ 238723, 1 ex., 180.4 mm SL; data as for holotype.

Diagnosis.—*Plotosus fisadoha* can be diagnosed from congeners except for *P. abbreviatus* and *P. lineatus* in having fewer total rays in confluent median fins (139–200 vs. 202–281) and vertebrae (54–63 vs. 72–85). *Plotosus fisadoha* differs from *P. abbreviatus* in having a longer pelvic fin (9.7–9.8 %SL vs. <8.6), deeper body (13.1–13.3 %SL vs. <12.3), larger eye (13.1–14.3 %HL vs. 8.1) and shorter nasal barbels (40.7–44.0 %HL vs. 69.6), and from *P. lineatus* in having a more slender head and body (head depth 11.5–11.8 %SL vs. 12.0–13.0; body depth at dorsal-fin origin 13.1–13.3 %SL vs. 13.4–15.2), a smaller eye (13.1–14.3 %HL vs. 15.1–18.4) and a body lacking pale horizontal stripes (vs. stripes present).

Description.—Morphometric and meristic data presented in Table 1. Body laterally compressed and somewhat anguilliform, tapering posteriorly. Anus and urogenital openings located at vertical through midpoint of appressed pelvic fin. Dendritic organ located posterior to anus. Skin smooth. Lateral line complete and midlateral in position.

Head depressed and broad. Snout margin rounded viewed from above. Upper lip fleshy, plicate and papillose. Gill openings wide, extending from posttemporal region to beyond isthmus (i.e., to a vertical through anterior orbital margin). Gill membranes free from isthmus and each other.

Four pairs of barbels, each barbel somewhat broadened and flattened. Maxillary barbel extending posteriorly to preopercle when appressed. Nasal barbel extending to posterior margin of orbit. Origin of inner mandibular barbel near to midline; barbel thicker and longer than nasal barbel and extending to vertical through posterior orbital margin. Outer mandibular barbel originating posterolateral to inner mandibular barbel, extending to level of preopercle.

Eye ovoid, horizontal axis longest; located entirely in dorsal half of head.

Mouth subterminal. Oral teeth small, peg-like or molariform, in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rounded, of equal width

Table 1.—Morphometric and meristic data for *Plotosus fisadoha*.

	UMMZ 235269 (holotype)	UMMZ 238723 (paratype)
Morphometrics		
SL	191.8	180.4
In %SL		
Head length	23.9	23.7
Head width	13.7	15.2
Head depth	11.5	11.8
Predorsal distance	28.4	28.8
Preanal length	45.6	42.8
Prepelvic length	37.7	37.3
Prepectoral length	22.5	21.0
Body depth at dorsal-fin origin	13.3	13.1
Pectoral-fin length	15.0	14.9
Length of dorsal-fin base	5.8	4.9
Pelvic-fin length	9.7	9.8
Caudal-fin length	7.8	8.3
In %HL		
Snout length	39.2	39.0
Interorbital distance	32.9	33.4
Eye diameter	13.1	14.3
Nasal barbel length	44.0	40.7
Maxillary barbel length	52.3	47.0
Inner mandibular barbel length	41.4	43.0
Outer mandibular barbel length	47.7	47.0
Meristics		
Dorsal fin rays	I,4	I,4
Pectoral fin rays	I,12	I,11
Pelvic fin rays	iii,8	iii,7
Procurrent caudal rays in dorsal lobe	89	89
Caudal fin rays	10	10
Anal fin rays	65	72
Branchiostegal rays	11	11
Gill rakers on first gill arch	6 + 16	6 + 16
Vertebrae	16 + 43 = 59	17 + 41 = 58

throughout. Dentary tooth band much narrower than premaxillary tooth band at symphysis, tapering laterally. Vomerine tooth patch a median triangle of molariform teeth.

Dorsal fin located above anterior third of body; origin nearer tip of snout than caudal flexure. Dorsal-fin margin convex, first fin ray longer than others. Dorsal-fin spine straight and robust (broken in both specimens). Anal fin with long base and extending along posterior half of body. Caudal fin lanceolate, with greatly enlarged upper procurrent rays forming a second dorsal fin extending along posterior two thirds of body. Anal and caudal fins confluent, forming a continuous median fin along posterior two thirds of body dorsally, posterior half of body ventrally. Pelvic-fin origin at vertical through anterior end of upper procurrent caudal-fin rays. Pelvic-fin margin slightly convex, tip of appressed fin reaching anal-fin origin. Pectoral fin with stout spine (broken off in both specimens). Pectoral-fin margin straight anteriorly, convex posteriorly.

Coloration in preservative.—Dorsal and lateral surfaces of head and body uniform brown; ventral surfaces of head, breast and

belly lighter brown, with scattered melanophores. Barbels brown, gradually fading in color distally. Dorsal and confluent anal + caudal fins hyaline, with dark brown distal margin. Pectoral and pelvic fins hyaline, with sporadically distributed small, dark-brown spots.

Distribution.—Known only from the coastal waters off the southeastern coast of Madagascar, Fianarantsoa Province, near town of Farafangana (22°49′S, 47°49′E). There are no coral reefs in this region of Madagascar, and the new species likely inhabits sandy and muddy coastal lagoons and estuaries, as opposed to *P. lineatus* which inhabits coral reefs. It is likely that with more intensive survey of Madagascar's nearshore marine fauna additional collection localities will be discovered.

Etymology.—From a Malagasy contraction of the words fisaka, meaning flat and loha, meaning head. In reference to the broad, flattened head of this species, especially when compared with the sympatric *P. lineatus*. An unlatinized specific epithet used as a noun in apposition.

Comparative material.—*Plotosus abbreviatus*: BMNH 1894.8.3.35, 1 ex., holotype, 382 mm SL; Borneo: Sarawak, mouth of Baram River.

Plotosus canius: UMMZ 225087, 1 ex., 156.0 mm SL; Thailand: Cholburi, Gulf of Thailand, shore near Ban Si Racha. UMMZ 227490, 1 ex., 228.0 mm SL; Vietnam: Ba Xuyen province, Giao, 3 km S of Truong Binh at mouth of Bassac. UMMZ 234299, 1 ex., 211.0 mm SL; Thailand: market at Chantaburi.

Plotosus limbatus: USNM 219576, 4 ex., 343–366 mm SL; Sri Lanka: Kakaithivu fish landing, about 3 miles S of Vaddukkodai.

Plotosus lineatus: UMMZ 185455, 24 ex., 78.8–165.0 mm SL; Madagascar: Tulear. USNM 350021, 24 ex., 28.6–36.9 mm SL; Mauritius: W coast, Baie de la Petite Riviere, around and off rocks at N end of public beach at Albion, just S of Pointe Petite Riviere.

Plotosus nkunga: USNM 226490, 3 ex., paratypes, 432–489 mm SL; South Africa: eastern Cape, Kasonga.

Plotosus papuensis: USNM 217106, 30.7–146.5 mm SL; Papua New Guinea: mainstream of Palmer and lower end of small tributary about 1 km up the Palmer from Thompson junction (mouth of Wai Mungi), 65 km NE of Kiunga, 930 km upriver from Toro pass (6°46′48″S 141° 36′36″E).

Additional data of the last five species listed above obtained from Gomon & Taylor (1982).

Remarks.—*Plotosus fisadoha* and *P. lineatus* are the only species of *Plotosus* known from Madagascar to date (see Sauvage 1891, Pellegrin 1933, Kiener 1963, Bauchot & Bianchi 1984).

Plotosus fisadoha differs from all congeners except *P. lineatus* (and possibly *P. abbreviatus*) in having fewer total rays in confluent median fins and vertebrae (Table 2). It further differs from *P. canius* in having longer pectoral and pelvic fins, barbels and snout, a longer and deeper head, and a larger eye (Table 2); from *P. limbatus* in having longer pelvic fins, head and barbels (Table 2); from *P. nkunga* in having a longer, narrower head and wider interorbital distance (Table 2); and from *P. papuensis* in having longer pelvic and pectoral fins, snout, barbels, a narrower and more slender head, more slender body, wider interorbital distance and larger eye (Table 2).

Plotosus fisadoha resembles *P. lineatus* most closely in the number of total rays in confluent median fins and vertebrae. However, it can be easily distinguished from *P. lineatus* in having a more slender head and body, and a smaller eye (Table 2). The color patterns of *P. fisadoha* and *P. lineatus* also differ substantially. The former species is uniform brown in coloration and lacks pale horizontal stripes on the body, whereas the latter species usually possesses two or three pale horizontal stripes on the dorsal and lateral surfaces of the body, with two of the stripes extending to the head.

Table 2.—Diagnostic morphometric and meristic characters for *Plotosus* species. Uncertainties in data for *P. abbreviatus* are due to the damaged caudal region of the holotype.

	P. fisadoha	*P. abbreviatus*	*P. canius*	*P. limbatus*	*P. lineatus*	*P. nkunga*	*P. papuensis*
Head length (%SL)	23.7–23.9	<26.5	20.4–21.7	18.0–19.2	22.6–24.3	20.8–22.0	23.9–24.5
Head width (%SL)	13.7–15.2	<17.6	14.3–15.2	13.8–14.9	13.7–15.0	15.7–16.0	15.6–16.0
Head depth (%SL)	11.5–11.8	<11.9	10.5–10.7	11.3–13.0	12.0–13.0	11.8–12.1	12.8–13.6
Body depth at dorsal-fin origin (%SL)	13.1–13.3	<12.3	11.7–13.2	12.9–14.6	13.4–15.2	13.3–13.4	16.4–16.5
Pectoral-fin length (%SL)	14.9–15.0	<13.5	10.0–11.5	12.7–14.9	13.0–15.6	13.1–14.5	13.9–14.3
Pelvic-fin length (%SL)	9.7–9.8	<8.6	5.4–7.1	7.1–8.8	8.3–10.0	6.9–8.1	7.8–8.8
Snout length (%HL)	39.0–39.2	39.5	33.5–36.1	39.4–43.1	35.7–41.9	38.2–38.6	35.7–37.9
Interorbital distance (%HL)	32.9–33.4	31.5	29.3–34.0	32.7–33.3	30.6–34.3	24.2–25.6	30.6–31.3
Eye diameter (%HL)	13.1–14.3	8.1	9.2–10.7	13.8–15.5	15.1–18.4	13.4–13.7	8.7–10.3
Nasal barbel length (%HL)	40.7–44.0	69.6	83.4–95.2	34.9–62.6	46.4–47.3	37.1–37.6	55.3–64.1
Maxillary barbel length (%HL)	47.0–52.3	65.3	81.1–88.4	38.6–62.6	56.3–61.8	33.8–33.9	68.2–71.0
Outer mandibular barbel length (%HL)	47.0–47.7	52.3	66.1–75.2	39.9–61.4	53.6–57.4	40.2–41.3	39.6–57.3
Total confluent median fin rays	164–171	>175	247–281	210–243	139–200	202–237	221–247
Total vertebrae	58–59	>59	78–85	73–78	54–63	72–78	74–77

Boulenger (1895) distinguished *P. abbreviatus* from congeners on the basis of fewer caudal-fin rays (10 vs. 18). Examination of a radiograph of the holotype shows that the caudal region was damaged and subsequently healed, as evidenced by the lack of both hypurals and epurals and the asymmetric nature of the regenerated caudal region. Such damage and regeneration is often seen in catfishes with anguilliform bodies (and most notably in *Clarias*; Lim & Ng 1999). Caudal region deformation in the only known specimen of *P. abbreviatus* makes comparison to congeners a little more difficult. Morphometric ratios based on %SL cannot be reliably established and the values presented in Table 2 are likely inflated (i.e., SL of the deformed specimen is less than it would be if undamaged). Nevertheless, *Plotosus fisadoha* is still easily distinguished from *P. abbreviatus* in having a longer pelvic fin, deeper body, larger eye and shorter nasal barbels (Table 2).

The Malagasy nearshore marine fauna is extremely poorly studied and desperately in need of survey. To date, nearshore marine collections are known for only a few scattered localities, particularly collections made by Bardach and Maugé in the late 1960's from the region of Tulear in southwestern Madagascar. It is likely that with intensified survey efforts of this fauna, additional localities will be discovered for the new species.

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